PROCEEDINGS

OF

THE ROYAL SOCIETY.

1846. No. 63.

February 26, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

Lieut. Kay, R.N., and Major Moore were elected Fellows of the Society.

"Illustrations of the Viscous Theory of Glaciers." By James David Forbes, Esq., F.R.S. &c. Part III.

The author inquires, in this part of his paper, into the motion of those comparatively small isolated glacial masses, reposing in the cavities of high mountains or on *cols*, and called by De Saussure *glaciers of the second order*. A glacier of this description in the neighbourhood of the Hospice du Simplon, lodged in a niche on the northern face of the Schœnhorn, immediately behind the Hospice, and at an elevation of about 8000 feet above the sea, was selected for observation. The average velocity of its descent was found to be about one inch and a half in twenty-four hours: those parts in which the slope was 20° moving with a velocity about one-third greater than those in which the slope was 10°. The author next enters into general views on the annual motion of glaciers, and on the influence of seasons; and gives tabular details of the observations made with reference to these questions at two stations; the one on the Glacier des Bossons, and the other at the Glacier des Bois, which is the outlet of the Mer de Glace towards the valley of Chamouni. In both these glaciers, the motion in summer exceeds that in winter in a greater proportion as the station is lower, and consequently exposed to more violent alternations of heat and cold. He also found that the variations of velocity due to season are greatest where the variations in the temperature of the air are greatest, as in the lower valleys; excepting that variations of temperature below the freezing-point produce scarcely any appreciable change in the rate of motion of the ice. He concludes with some general illustrations of the plastic or viscous theory of glacier motion. A glacier, he contends, is not a mass of fragments or parallelopipedons; neither is it a rigidly solid body; and although it may be extensively intersected by crevices, these "crevasses" are com-

paratively superficial, and do not disturb the general continuity of the mass in which they occur. The water contained in these crevices is only the principal vehicle of the force which acts upon it: and the irresistible energy with which the whole icy mass descends from hour to hour with a slow but continuous motion bespeaks of itself the operation of a fluid pressure acting on a ductile or plastic material.

March 5, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On the Physics of Media that are composed of free and perfectly elastic Molecules in a state of Motion." By J. J. Waterson, Esq. Communicated by Captain Beaufort, R.N., F.R.S.

This memoir contains the enunciation of a new theory of heat, capable of explaining the phenomena of its radiation and polarization, and the elasticity of various bodies, founded on the hypothesis of a medium consisting of a vast multitude of minute particles of matter endowed with perfect elasticity, and enclosed in elastic walls, but moving in all directions within that space, with perfect freedom, and in every possible direction. In the course of these motions, the particles must be supposed to encounter one another in every possible manner, during an interval of time so small as to allow of their being considered infinitesimal in respect to any sensible period; still, however, preserving the molecular *vis viva* constant and undiminished.

The author then enters into extensive analytical investigations; first, of the conditions that determine the equilibrium of such a homogeneous medium, as is implied by the hypothesis, and of the laws of its elasticity; secondly, of the physical relations of media that differ from each other in the specific weight of their molecules; thirdly, of the phenomena that attend the condensing and dilating of media, and of the mechanical value of their molecular *vis viva*; fourthly, of the resistance of media to a moving surface; fifthly, of the vertical equilibrium of a medium surrounding a planet and constituting its atmosphere; and lastly, of the velocity with which impulses are transmitted through a medium so constituted.

In an Appendix, the author enters into a full explanation of a table of gases and vapours, drawn up with reference to the subjects discussed in his paper.

March 12, 1846.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

"On the Blow-hole of the Porpoise." By Francis Sibson, Esq. Communicated by Thomas Bell, Esq., F.R.S.

The external opening of the air-passage of the porpoise is so